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(71) Applicant
A C Egerton Limited

(Incorporated in the United Kingdom)

Murray Road, Leasons Hill, Orpington, Kent, BR5 3QU,
United Kingdom

(72) Inventor
Andrew Philip Charles Dooley

(74) Agent and/or Address for Service
Fry Heath & Spence
St George's House, 6 Yattendon Road, Horley, Surrey,
RH6 7BS, United Kingdom

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H01R 31/06 // H01R 4/24 13/514 13/627 13/73 19/00

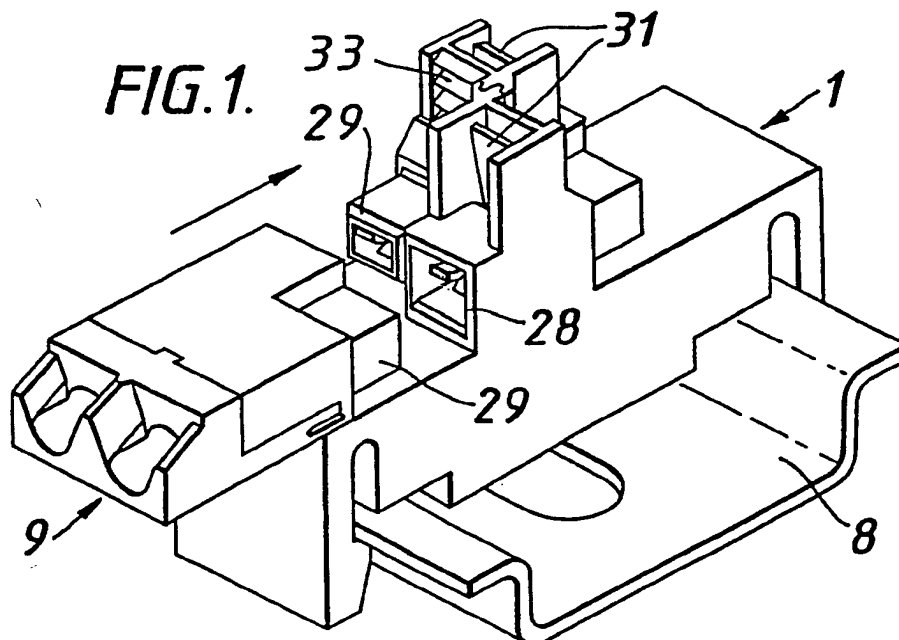
(52) UK CL (Edition L)
H2E ECBA ECBX ECCC EDCN EDCU EDLA EPGT
E203 E221
U1S S2214

(56) Documents cited
GB 2091050 A GB 1036976 A US 4932051 A
US 4917625 A US 4861287 A US 4790770 A
US 4367908 A US 4362905 A

(58) Field of search
UK CL (Edition K) H2E
INT CL⁵ H01R, H04M

(54) Transmission line connectors and assemblies thereof

(57) In a transmission wire or line connector sub-assembly capable of installation with one or more other such sub-assemblies as a modular connector assembly, the connector sub-assembly comprises a connector unit (1) provided with two ports interconnected by means of an intermediate contact member; and two connector blocks (9), each carrying a primary contact, said primary contact being arranged at a connector block port and thereof to disconnectably engage the intermediate contact one at each of the connector unit ports, and at another end being arranged to receive an exchange or a subscriber transmission line and electrically connect the same to said primary contact, whereby, on engagement of the connector block port with a connection unit port, to make electrical connection with the intermediate contact therein. Unit (1) is in two halves held together by a body snap fitting with a rail (8). Block (9) comprises hinged parts closeable to make an id connection. Unit (1) includes a straight through contact, a test contact (3) and a surge arrester.

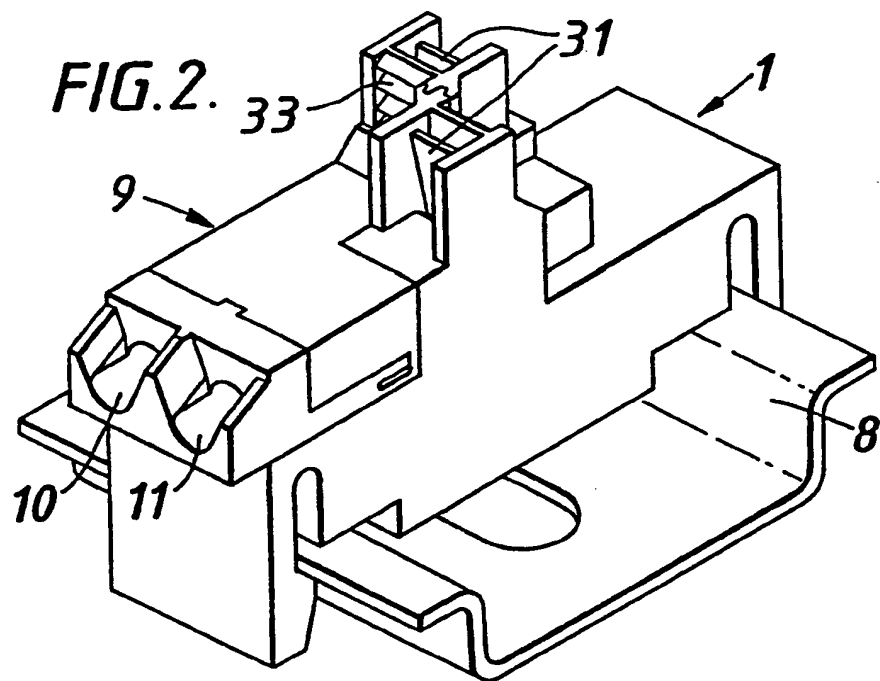
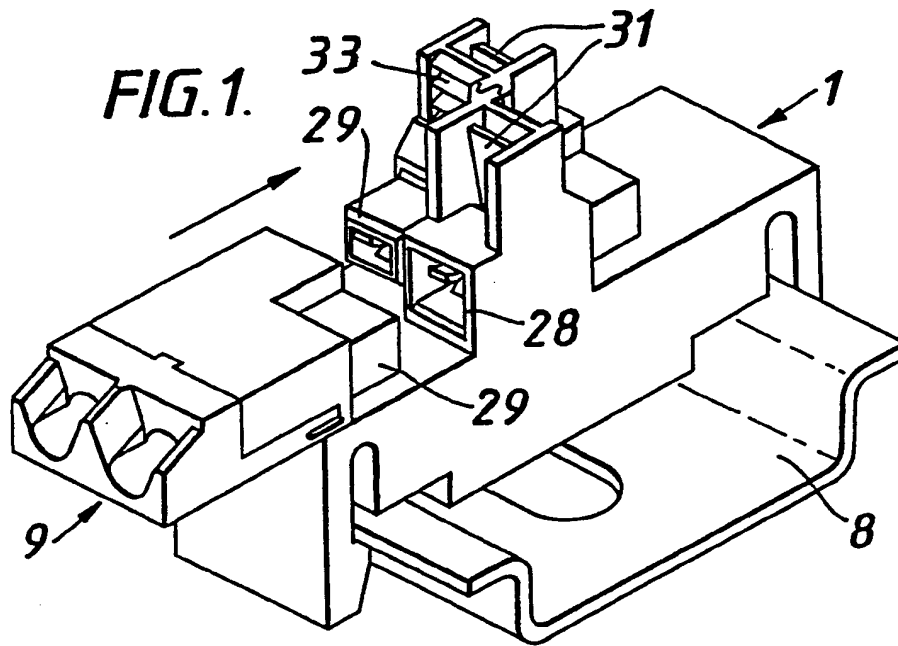


At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

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FIG. 3.

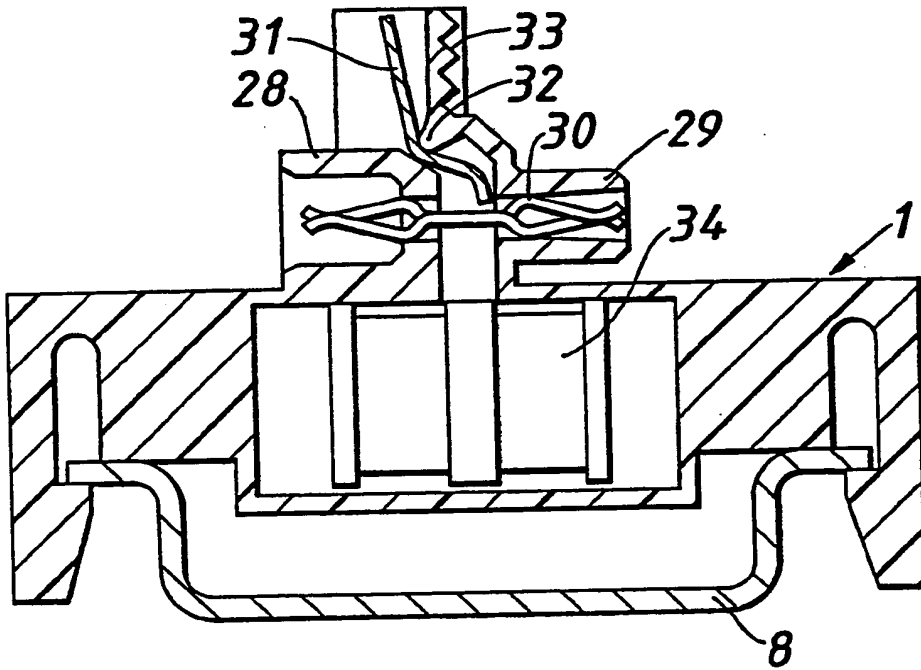
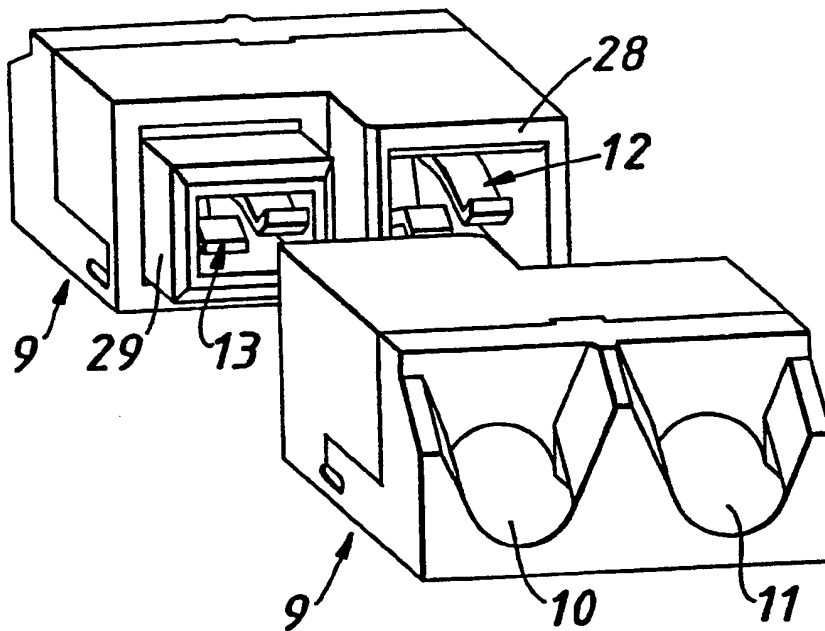


FIG. 4.



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FIG. 5.

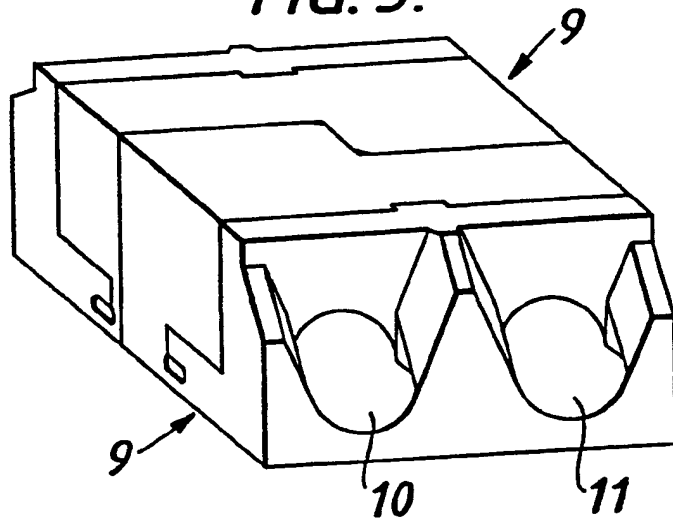


FIG. 6.

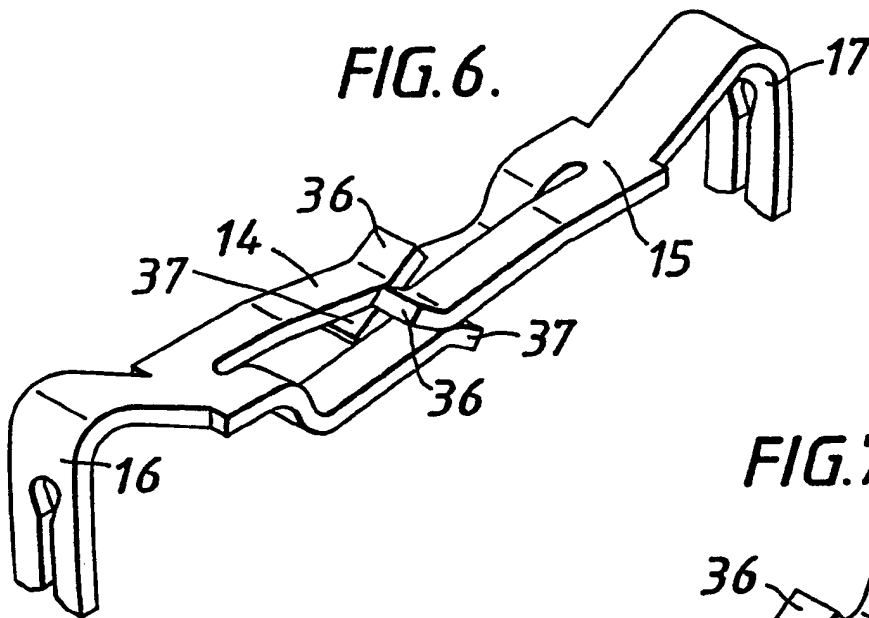
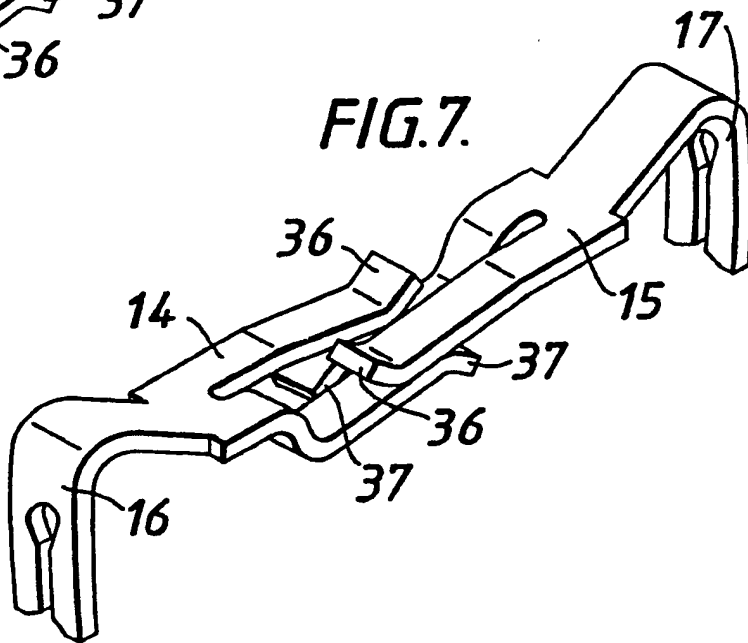


FIG. 7.



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FIG. 8.

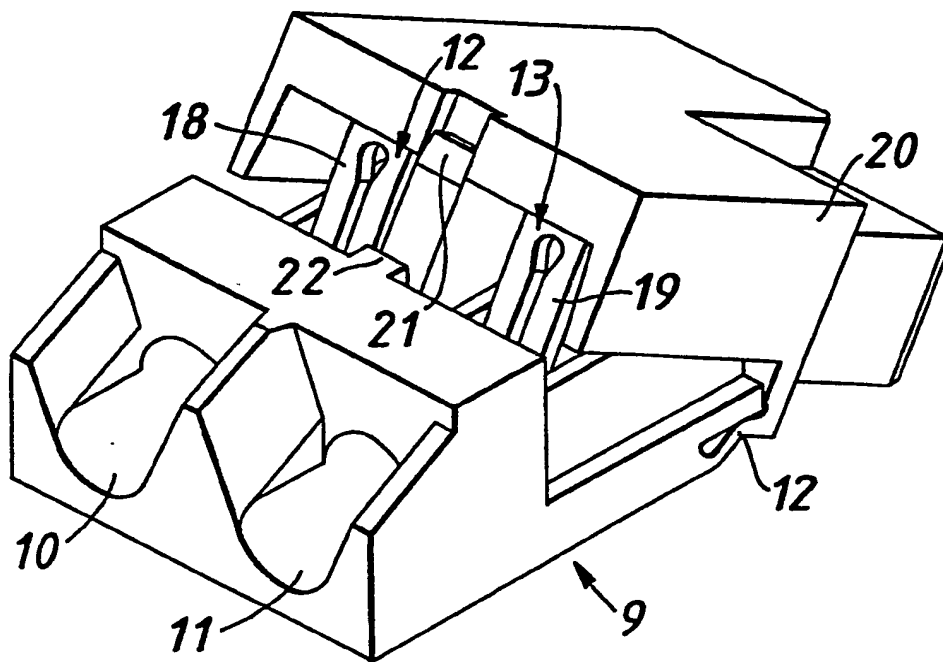
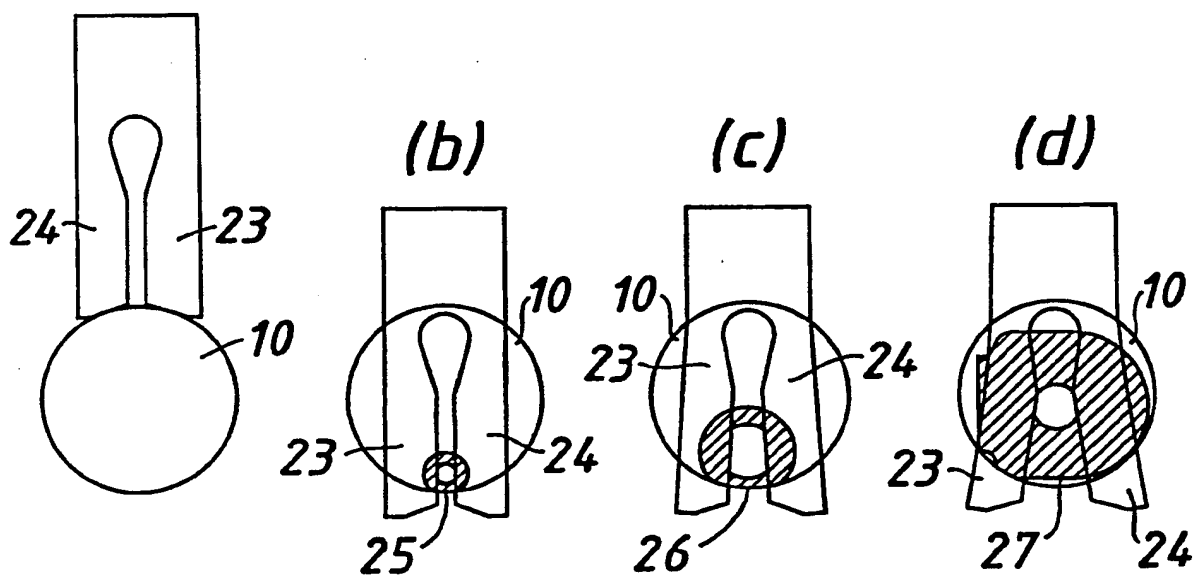
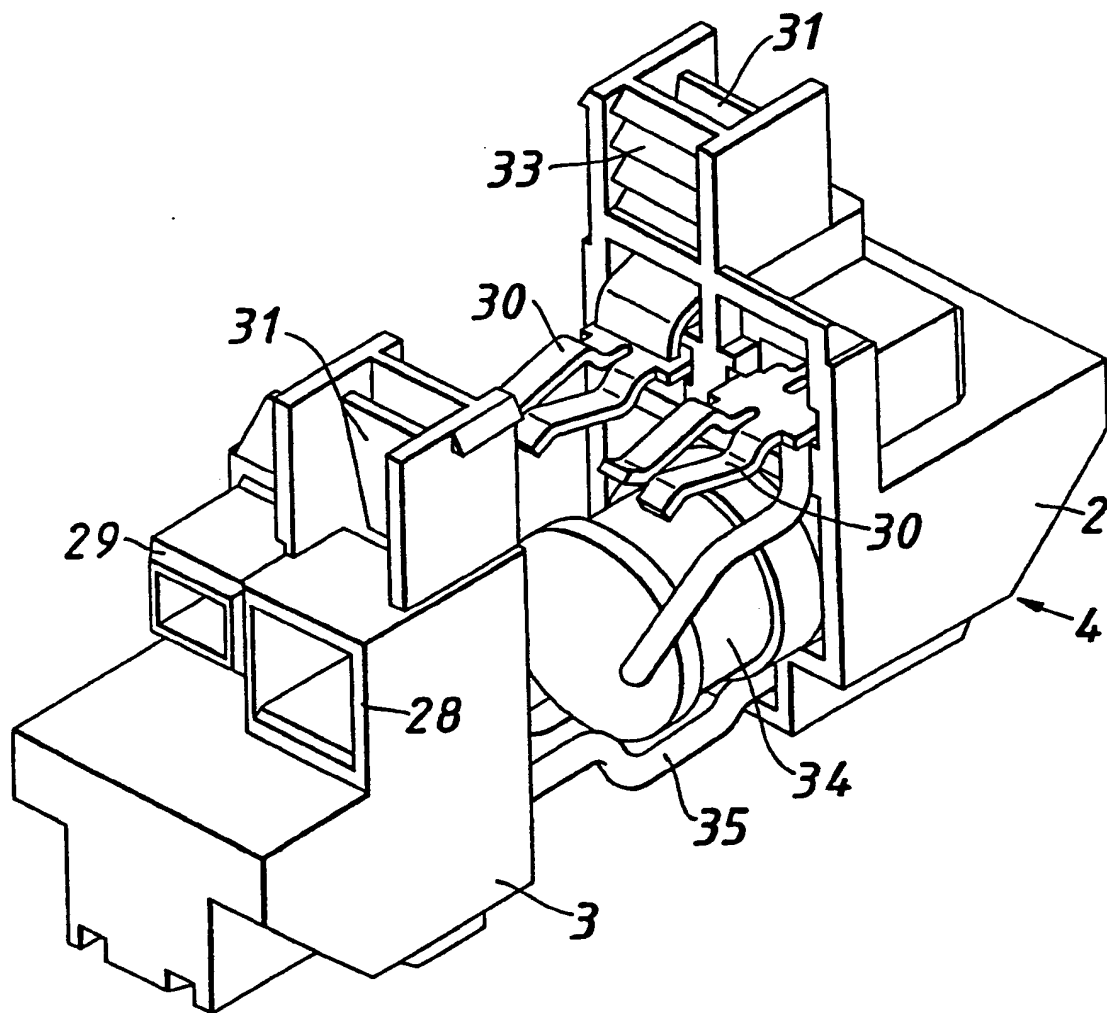


FIG. 9(a)



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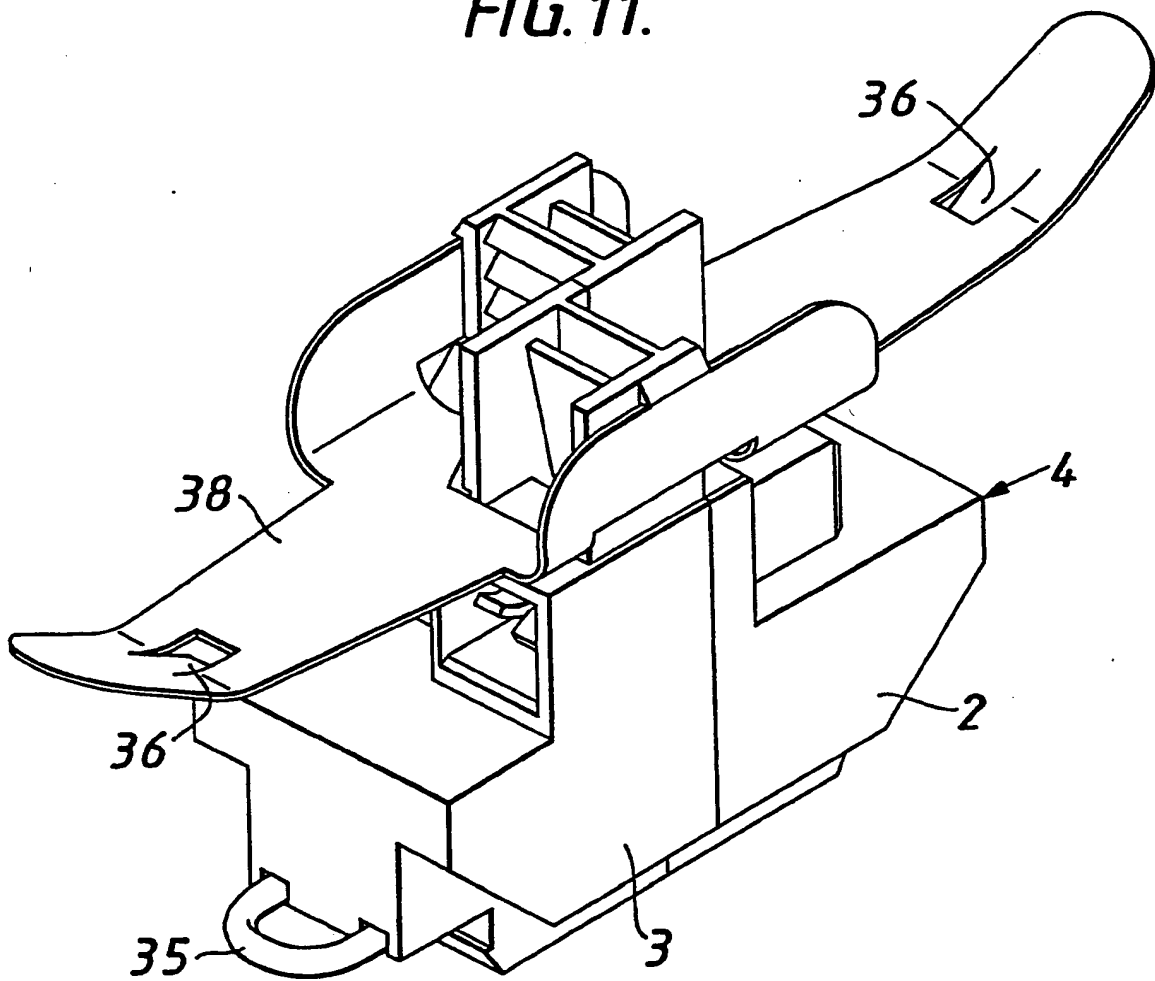
FIG. 10.



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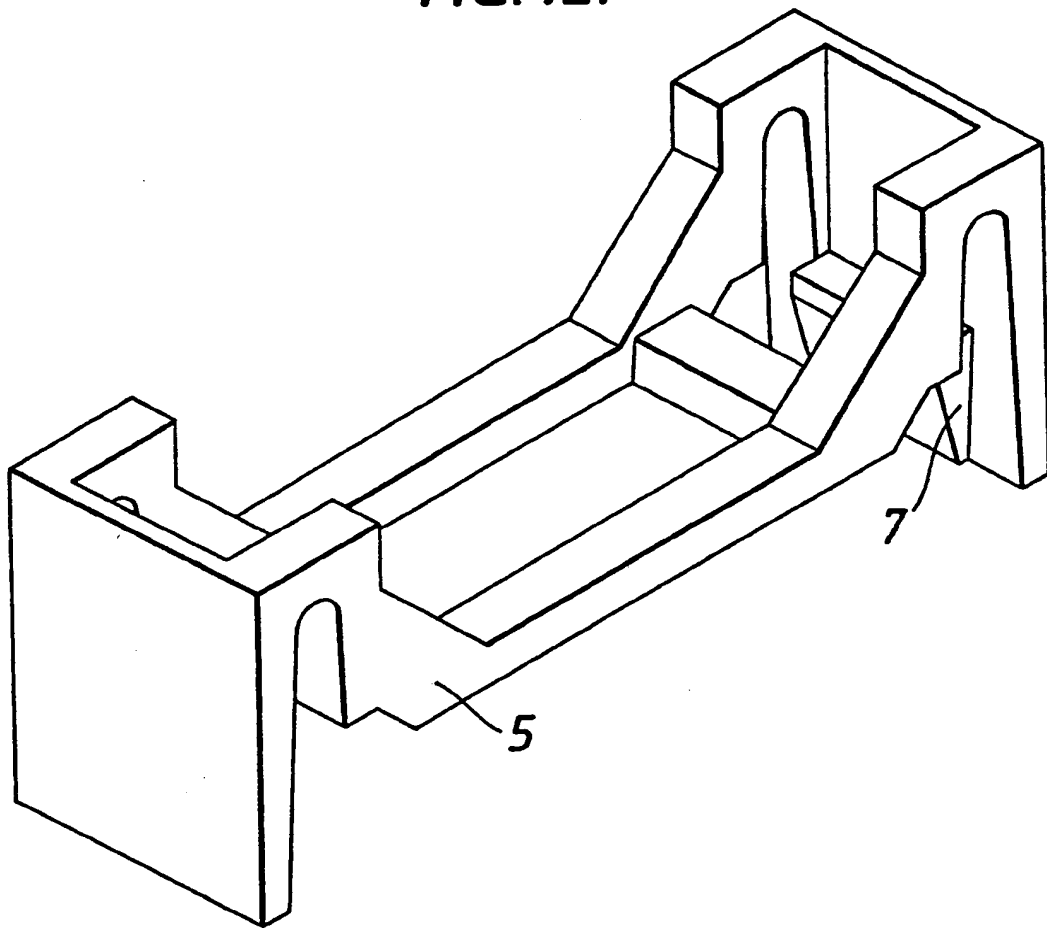
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FIG. 11.



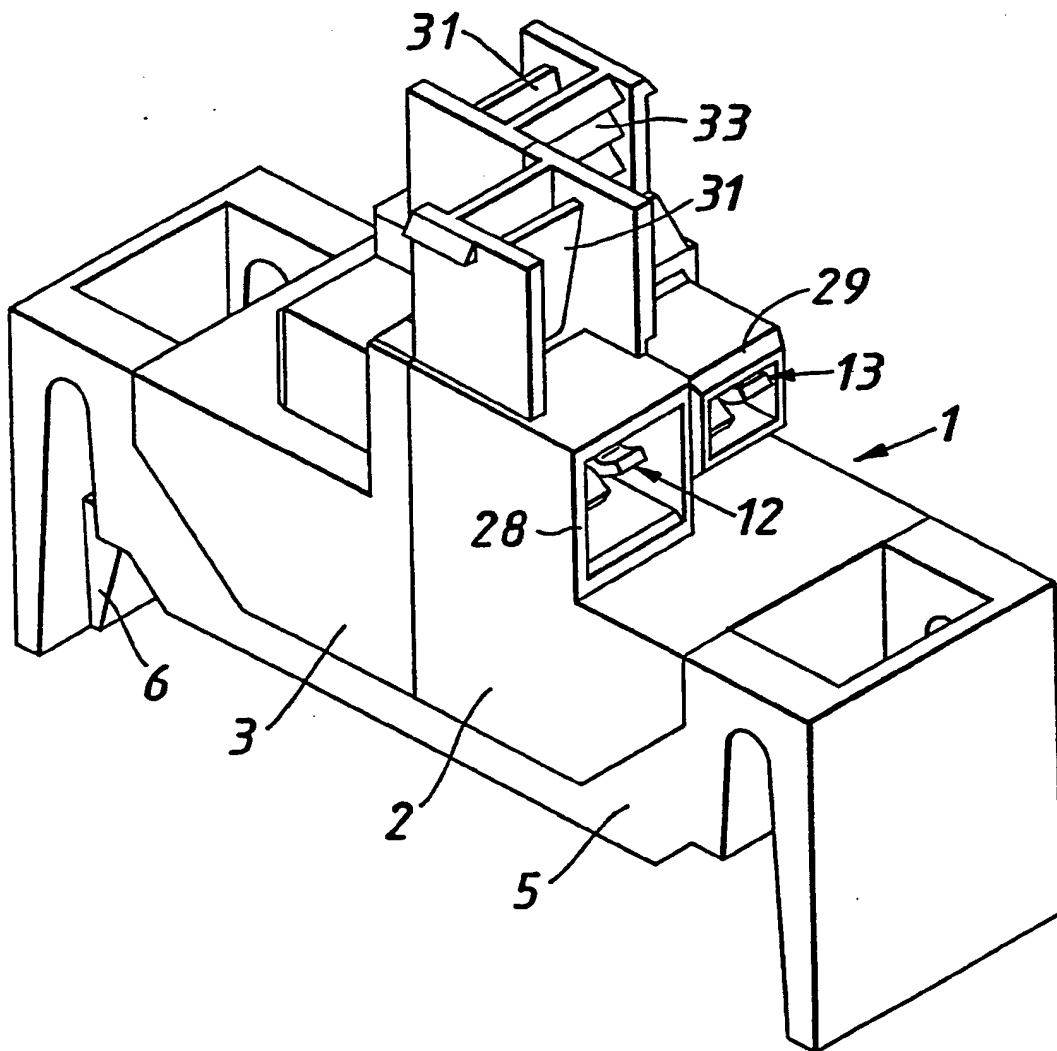
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FIG. 12.



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FIG. 13.



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TRANSMISSION LINE CONNECTORS AND ASSEMBLIES THEREOF

This invention relates to transmission wire or line connectors and assemblies thereof, and more particularly, although not exclusively, to connector assemblies for linking telecommunication lines together, particularly lines from a telecommunications exchange to lines leading to subscribers to the telecommunications system.

It is known to provide such assemblies in which a plurality of contacts having line insulation penetration clips are connected at one end to lines from a telecommunications exchange. Lines leading to the telecommunications subscribers are then connected, either directly or indirectly, to the other end of the contacts.

Hitherto it has been common for such assemblies to comprise a complete fabrication capable of connecting a multiplicity of lines from the exchange, to a multiplicity of subscriber lines. Such an arrangement lacks flexibility of usage in relation to the number of lines to be connected at any particular point of installation. Again, commonly the connection of the exchange lines into the assembly is at a different position, and by a different mechanism, to the connection of subscribers lines. Thus, it is common for the multiplicity of exchange lines to be connected firstly into the assembly, usually on one side of the assembly, and often all at the same time and in a semi-permanent fashion, whereafter subscriber lines are connected individually and separately as required on another side of the assembly, often by a different mechanism, to contacts linking with the appropriate exchange lines. Again, such an arrangement is of limited flexibility of usage in the field.

It is an object of the present invention to provide transmission line connectors and assemblies thereof arranged for simple, flexible, and effective usage by operatives in the field.

In accordance with the present invention there is provided a transmission wire or line connector unit capable of installation with one or more other such units as a modular connector assembly, in which the connector unit is provided with two ports interconnected by means of

an intermediate contact member; and two connector blocks, each carrying a primary contact, said primary contact being arranged at a connector block port end thereof to disconnectably engage the intermediate contact one at each of the connector unit ports, and at another end being arranged to receive an exchange or a subscriber transmission line and electrically connect the same to said primary contact, whereby, on engagement of the connector block port with a connection unit port, to make electrical connection with the intermediate contact therein.

By means of the invention two connector blocks, for example, carrying and connecting to transmission lines from the exchange and from a subscriber respectively can be linked disconnectably through the ports in the connector unit and the intermediate contact passing therebetween. It will be appreciated that this enables easy connection and disconnection between the exchange line and the subscriber line giving considerable ease of operation and testing, and that the connector unit, acting as a module, can be assembled with a plurality of the same to provide a total assembly appropriate for the number of lines to be interconnected.

The interconnecting ports of the connector unit may be disposed on opposed sides of the unit, so that connector blocks can methodically be connected in association with such ports on one side or the other

depending, for example, upon whether they are exchange or subscriber lines.

The connector unit may incorporate a plurality of said two interconnecting ports, and in line with normal customary practice of a telecommunications system, may include a pair of such two interconnecting ports so that a pair of subscriber lines can be connected to a pair of exchange lines.

The interengagement of the connector block to the connector unit may be by means of a spigot and socket arrangement between appropriately sized ports of the unit and of the connector block. Where the unit is provided with a pair of interconnecting port, one port on one side may be of a spigot configuration and size, whilst the other port on that side may be of a socket configuration and size, the associated connector block being provided with interengaging corresponding socket and spigot ports respectively. On the other side the arrangement may be of a reversed image nature so that any connector block will be connectable on either side of the connector unit.

Means may be provided for holding in place in a locked fashion each connector block to the connector unit.

The connector blocks may be so shaped and dimensioned that in addition to being capable of connection with ports on either side of the connector body unit, they are equally capable of direct interconnection together whereby the wiring of a testing device inserted into a wire inlet

or inlets of a connector block and connected therein to the primary contact passing therethrough, can be connected for testing direct to a subscriber or exchange transmission line.

The connector unit may be provided with a test contact access point between each of the two interconnected ports, so that by means of a test contact, connectable to a test probe, the electrical state and condition of the intermediate contact passing between the two interconnecting ports can be tested.

The intermediate contacts between two interconnecting ports may be double ended with male/female parts at each end, and similarly the primary contacts within the connector blocks will, at their ports connectable to the ports of the connector unit, have complementary female/male parts whereby any two contacts associated with any two interconnectable ports will be capable of firm engagement between the respective male/female parts.

Conveniently, the connector block units, acting as modules of an assembly, are interconnected by mounting on an appropriate rail or similar body which may be arranged to be disposed in a suitable box.

It is to be understood that the invention includes within its scope an assembly of a plurality of connector units as hereinbefore described.

In order that the invention may be more readily understood one embodiment thereof will now be described by

way of example with reference to the accompanying drawings in which:-

Figure 1 illustrates in isometric view a connector unit in accordance with the invention to which a connector block is about to be connected, the connector unit being mounted on an assembly support rail;

Figure 2 shows the arrangement of Figure 1 with the connector block having made contact with the connector unit;

Figure 3 is a section of the connector unit of Figure 1;

Figure 4 illustrates isometrically two connector blocks adjacent one another;

Figure 5 shows the connector blocks of Figure 4 connected together;

Figures 6 and 7 illustrate isometrically the contact making arrangement between male and female parts of two primary contacts;

Figure 8 illustrates isometrically a connector block opened for receipt of transmission lines;

Figures 9 (a) (b) (c) (d) illustrate schematically the method of acceptance and connection between a transmission line and the relevant bifurcation of a primary contact;

Figure 10 is an isometric view of the two part body of the connector unit separated to show internal features;

Figure 11 illustrates isometrically the body of the connector unit carrying a clip member for locating in position the connector blocks;

Figure 12 shows isometrically the carriage of the connector unit body which is arranged for connection to the support rail; and

Figure 13 shows the body of Figure 11 mounted on the carriage of Figure 12.

Referring now to the drawings it will be seen that a connector unit 1 of plastics material is formed from two identical halves 2,3 (Figures 10, 11 and 13) of a connector body 4, and a carriage 5 therefor. The two half bodies 2,3 are held together, after installation of the appropriate equipment therein, by means of positive location upon the carriage 5. The carriage in turn is provided with snap wedges 6,7 for location under the rim of a metal support rail 8 running the length of a plastics box (not shown) upon which rail 8 a plurality of connector units 1 may be assembled side by side to provide a modular connector assembly of any required length. Typically, each connector unit 1 has a width across the rail of the order of 45 mm and a length along the rail of the order of 12 mm. The box and its accompanying rail may be so dimensioned as to enable the accommodation of up to thirty connector units.

Associated with the connector unit are plastics connector blocks 9, and each connector block carries a

pair of line inlet ports 10,11 arranged to receive either a pair of exchange lines or a pair of subscriber lines (not shown). Their insertion can be best understood from Figure 8. Figure 8 shows a connector block 9 opened about a hinge portion 12 to enable the insertion of transmission lines through its ports 10,11. As can be seen the connector block carries primary metal contacts 12,13 of the kind shown in Figures 6 and 7, the forward end 14,15 projecting towards the connecting bores, and the trailing end 16,17 depending ready for contact with the incoming exchange or subscriber line.

In operation with the connector block 9 in the disposition shown in Figure 8, the transmission lines are passed through the opening ports 10,11 so as to lie beneath the trailing ends 18,19 of the contacts. The contact sub-block 20 is now closed and locked by means of a central resilient catch 21,22, this closing action operating the bifurcated depending portions 23,24 of the contacts as best illustrated in Figures 9 (a) (b) (c) and (d) to cut through the insulation of the transmission line and make good firm contact with the metal of the line.

It is to be appreciated from Figures 9 (a) (b) (c) and (d) that the forked nature of the contact and its stiff resilience, enables it satisfactorily not only to make good electrical contact with the exchange line conductor 25 shown in Figure 9 (a), but also with significantly different diameter subscriber lines 26,27.

(known as drop wires) as illustrated in Figures (c) and (d).

It will be observed that the connector blocks connection ports are of a spigot and socket nature, in that one of the pair of ports 28 of each such connector block is of a greater internal diameter and carries with it the appropriately located male/female parts of the primary contact 12, whilst the other connector port 29 is of a lesser diameter carrying complementary female/male parts of its primary contact and is therefore capable of insertion in the juxtaposed socket either of the connector unit 1, or of a second connector block, whilst the larger dimensioned connector bore is capable of receiving the equivalent smaller dimensioned spigot either of the connector unit or the second connector block. It is to be noted that by the alternate arrangement on each side of the connector unit of spigot and socket ports, any connector block can be connected on either side of the connector unit. Similarly, any connector can be connected to any other connector, and by this means it is possible, for example, after having linked in the leads of testing equipment into a first connector block, to connect that first connector block to a second connector block already connected to a transmission line, be it exchange or subscriber, for testing purposes.

Figures 3 and 10 illustrate the internal layout of equipment within the connector unit body. As can be seen

best from the cross section of Figure 3, a socket 28 on one side of the unit is interconnected to a spigot 29 on the other side by means of a metallic double ended intermediate contact 30. Located above the intermediate contact is an integral unit including a metallic test contact 31 pivotable about a shoulder 32, normally lying out of contact with the intermediate contact member, but capable upon a crocodile clip (not shown) engaging a corrugated upstanding wall 33 and the test contact 31, of being brought into electrical contact with the intermediate contact 30 so that testing thereof and the lines connected to it can be carried out without any significant disturbance of the intermediate contact.

It is to be noted that, if required, a gas discharge tube or surge arrester 34 can be disposed in contact with the intermediate contact 30 and mounted in the body therebelow. The gas discharge tube 34 is also connected by means of wiring 35 shown in Figures 10 and 11, to the metal support rail to provide an earth contact for the tube. The gas discharge tube is a protective device and serves, when used, to absorb surges in electrical power, such as may be caused by lightning, and thereby prevent damage to telecommunication equipment.

The male/female portions of the contacts, and their manner of intercommunication can be seen from Figures 6 and 7. It will be seen that the leading part 14,15 of each contact is in the form of a fork, the left hand one

of which (looking forward) has at its end an up-turn 36, and the right hand one of which has at its end a down-turn 37. Interengagement between facing contacts is therefore always satisfactorily accomplished. Figure 6 shows two contacts just after interengagement, whilst Figure 7 shows those same contacts fully interengaged for good electrical communication therebetween.

In normal operation a connector block carrying a pair of exchange lines is connected into one side a connection unit, and a block carrying a pair of subscriber lines is connected into the other side for interlinking therebetween. The blocks may be positively locked in place by engagement with downturned pressed tubes 36 from an overlying metal plate 37.

It is to be understood that the foregoing is merely exemplary of transmission wire connectors in accordance with the invention and that modifications can readily be made thereto without departing from the true scope of the invention.

CLAIMS

1. A transmission wire or line connector sub-assembly capable of installation with one or more other such sub-assemblies as a modular connector assembly, in which the connector sub-assembly comprises a connector unit provided with two ports interconnected by means of an intermediate contact member; and two connector blocks, each carrying a primary contact, said primary contact being arranged at a connector block port end thereof to disconnectably engage the intermediate contact one at each of the connector unit ports, and at another end being arranged to receive an exchange or a subscriber transmission line and electrically connect the same to said primary contact, whereby, on engagement of the connector block port with a connection unit port, to make electrical connection with the intermediate contact therein.
2. A sub-assembly as claimed in claim 1 wherein the interconnecting ports of the connector unit are disposed on opposite sides of the unit.
3. A sub-assembly as claims in claim 1 or 2 incorporating a plurality of said two interconnecting ports.
4. A sub-assembly as claimed in any one of the preceding claims including a pair of said two interconnecting ports.
5. A sub-assembly as claimed in any one of the

preceding claims wherein the inter-engagement of each connector block to the connector unit is by means of a spigot and socket arrangement between appropriately sized ports of the unit and the connector block.

6. A sub-assembly as claimed in claim 2, claim 4, and claim 5, wherein one port on one side of the unit is of spigot configuration and size, whilst the other port on that side is of a socket configuration and size, the associated connector block being provided with inter-engaging corresponding socket and spigot ports respectively.

7. A sub-assembly as claimed in claim 6 wherein the ports on the other side of the unit are of a reversed nature to the ports on said one side whereby any connector block is connectable on either side of the unit.

8. A sub-assembly as claimed in any one of the preceding claims including means for holding in place in a locked manner each connector block to the connector unit.

9. A sub-assembly as claimed in any one of the preceding claims wherein the connector blocks are so shaped and dimensioned as to be capable of direct interconnection together whereby wiring of a testing device, inserted into a wire inlet or inlets of a connector block and connected therein to the primary contact passing therethrough, can be connected for testing direct to a subscriber or exchange transmission line.

10. A sub-assembly as claimed in any one of the

preceding claims provided with a test contact access point between the or each two interconnected ports.

11. A sub-assembly as claimed in any one of the preceding claims wherein the intermediate contacts between the or each two interconnecting ports are double ended with male and female contact parts at each end, and the primary contacts within the connector blocks have. at their ports connectable to the ports of the connector unit. complementary female and male connector parts whereby any two contacts associated with any two interconnectable ports will be capable of firm engagement between the respective male and female parts.

12. A sub-assembly as claimed in any one of the preceding claims arranged for mounting on linking means for interconnection into an assembly of a plurality of units.

13. A transmission wire or line connector sub-assembly substantially as shown in and as hereinbefore described with reference to the accompanying drawings.

14. An assembly of a plurality of connector sub-assemblies, each sub-assembly being as claimed in any one of the preceding claims.

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

GB 9124355.0

Relevant Technical fields

(i) UK CI (Edition K) H2E

(ii) Int CI (Edition 5) H01R H04M

Search Examiner

MRS J BANNISTER

Date of Search

30 SEPTEMBER 1992

Databases (see over)

(i) UK Patent Office

(ii)

Documents considered relevant following a search in respect of claims AT LEAST CLAIM 1

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
Y	GB 2091050 A (BUNKER RAMO) see plug-on dropline (28) figure 8	1
X	GB 1036976 (AMP) see figures 1, 3. Example of type	1-5,8,12
X	US 4932051 (KARAN) see figure 5, items (37,67,68)	1-5,8,12
X	US 4917625 (HAILE) see figure 1 and column 4 lines (1-4)	1,2,8, 7-9,11
X	US 4861287 (BEVACQUA) see (33,32) solset (12), interconnect (40), and column 4 lines (34-38)	1-5,8,12
Y	US 4790770 (KLAIBER) see figure 1, incoming connector	1
X	US 4367908 (JOHNSTON) see figures	1,2,5,8
X	US 4362905 (ISMAIL) see figures 12, 18	1-5,8, 9,12

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

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